$\sin\left(\frac{\pi}{6}\right) = \frac{1}{2}$

$\cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$

$\tan(0) = 0$

$\sin(\pi) = 0$

$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$

$\cos\left(\frac{2\pi}{3}\right) = -\frac{1}{2}$

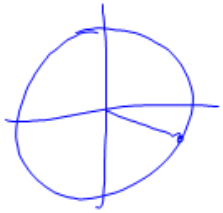
$\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$

$\tan\left(\frac{11\pi}{6}\right) = -\frac{\sqrt{3}}{3}$

$\cos\left(\frac{3\pi}{2}\right) = 0$

$\sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2}$

$-\frac{1}{\sqrt{3}} \Rightarrow -\frac{\sqrt{3}}{3}$



$$\frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} \Rightarrow -\frac{1}{2} \cdot \frac{2}{\sqrt{3}} = -\frac{1}{\sqrt{3}}$$

① $\frac{75^\circ}{x} = \frac{180^\circ}{\pi} \rightarrow 180x = 75\pi \rightarrow x = \frac{75\pi}{180} = \boxed{\frac{5\pi}{12} \approx 1.31 \text{ radians}}$

② $\frac{180}{\pi} = \frac{x}{\frac{7\pi}{11}} \rightarrow x\pi = \frac{180}{1} \cdot \frac{7\pi}{11} \rightarrow x\pi = \frac{1260\pi}{11}$

$x = \frac{1260}{11} \approx \boxed{114.55^\circ}$

③ $s = r\theta$

$s = 20 \cdot \frac{3\pi}{4} = \frac{60\pi}{4} = \boxed{15\pi \approx 47.12 \text{ in}}$

(4)

$r = 6$ cm

$\theta = 2\pi \cdot 200 = 400\pi$ rad.

$t = 1$ min or 60 sec.

$V = \frac{r\theta}{t}$, $V = \frac{6 \cdot 400\pi}{60} = 40\pi$ or 125.66 cm/sec.

Convert to feet per second

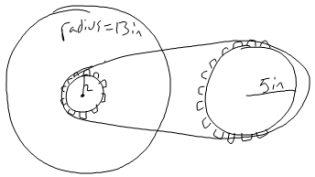
$\frac{40\pi}{1} \frac{\text{cm}}{\text{sec}} \cdot \frac{1 \text{ in}}{2.54 \text{ cm}} \cdot \frac{1 \text{ ft.}}{12 \text{ in}} = \boxed{4.12 \text{ ft/sec}}$

(6) $w = \frac{\theta}{t}$

$w = \frac{400\pi}{60} = \boxed{\frac{20\pi}{3} \approx 20.94 \text{ rad./sec}}$

(5)

Write down what you know first



(a) **Big**

$r_B = 5$ in

90 rotations per min

$\theta_B = 2\pi \cdot 90 = 180\pi$ radians

$t_B = 1$ min or 60 sec.

$\omega_B = \frac{\theta}{t} \Rightarrow$ $\omega_B = \frac{180\pi}{60} = 3\pi$ rad/sec.

Little

$r = 2$ in

S will be same as big and big $s = r_B\theta_B$ and little $s = r_s\theta_s$

$r_B\theta_B = r_s\theta_s$

$5 \cdot 180\pi = 2 \cdot \theta_s \longrightarrow \theta_s = \frac{5 \cdot 180\pi}{2} \longrightarrow \theta_s = 450\pi$

$\omega_s = \frac{\theta_s}{t_s} \longrightarrow$ $\omega_s = \frac{450\pi}{60} = \frac{15\pi}{2}$ rad/sec

(b) $V = r\omega$ ω of wheel is the same as ω of little sprocket

$V = 13 \cdot \frac{15\pi}{2}$

$V = \frac{195\pi}{2}$ in/sec.

(c) $\frac{195\pi}{2}\frac{\text{in}}{\text{sec}} \cdot \frac{1\text{ ft}}{12\text{ in}} \cdot \frac{1\text{ mile}}{5280\text{ ft}} \cdot \frac{60\text{ sec}}{1\text{ min}} \cdot \frac{60\text{ min}}{1\text{ hr}} = 17.4$ mph

For Number 6, see p. 123 in textbook